Influence of Social Group and Health/Exercise Program on Obesity Related Outcome Measures Among Obese Adolescents

Debra Braley

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INFLUENCE OF SOCIAL GROUP AND HEALTH/EXERCISE PROGRAM ON OBESEITY RELATED OUTCOME MEASURES AMONG OBESE ADOLESCENTS

by

Debra Braley

A Thesis
submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Arts
Department of Health, Physical Education and Recreation

Western Michigan University
Kalamazoo, Michigan
June 2005
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2005
ACKNOWLEDGMENTS

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Debra Braley
The purpose of this exploratory study was to determine the influence of a health/exercise program and social group on fat mass, weight, circumference measurements and body image among obese adolescents. Eighteen adolescents, ages 12-15 years were randomly assigned into 3 groups of 6. The parent/youth group (PYG) had 3 female and 3 male Caucasian participants. The peer group (PG) consisted of 2 females and 1 male Caucasians and 3 African-American females. The control group (CG) had 4 females and 1 male Caucasians and 1 African-American female. Body composition, weight, circumference measurements, and self-report questionnaires (Multidimensional Body-Self Relations Questionnaire, MBSRQ) were performed at pre/post treatments. The intervention consisted of 8, 90 minute weekly sessions involving 45 minutes of circuit training and education. Analysis of variance on fat mass indicated a significant difference among PYG, PG and CG, $F(2, 17) = 5.71, p = .01$. There was a significant difference in fat mass between the pretest mean and the posttest mean for groups participating in the exercise program and the CG that did not, $F(1) = 19.06, p = .01$. 
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INTRODUCTION

Obesity is a national problem among adults and youth, and the incidence of youth obesity is rising at an alarming rate. Not only is the physical health of children and adolescents at risk, but also their psychological and social well being is under assault. According to the Centers for Disease Control and Prevention (1999), 20% to 30% of children can be classified as overweight or at risk of overweight, and those numbers have nearly tripled over a 30-year time frame. According to the Michigan Youth Risk Behavior Survey (Michigan Department of Education, 2003), 15% of youth are at risk for becoming overweight and 12% are overweight. According to Dietz (2004), "This may be the first generation of children that will die before their parents, {and} one of the critical times in the development of overweight in the pediatric age group is adolescence" (p. 855).

Obesity is defined as an excessive accumulation of body fat using a comparison of body fat to fat free mass. Excess body fat can be assessed by using calipers to measure skin fold thickness, and obesity may also be measured using the body mass index (kg/m²) of 30 or greater based on both height and weight. However, according to Sondike, Copperman, and Jacobson (2000), a BMI measurement is not a foolproof assessment of obesity because it does not measure body composition or differentiate between body fat and fat-free body mass. In other words, a very muscular person with normal or even low body fat may have an above normal BMI,
as this is solely a measure of weight and height. In addition, because of pubertal changes in fat accumulation, this cannot be the only indication of obesity in children.

Numerous studies concerning youth obesity have been conducted with a variety of recommendations. Proposed solutions have been to increase physical activity, improve nutritious eating habits, reduce computer/television time, involve parental influence, involve peer influence, modify behavior, and change a sedentary lifestyle (Epstein, 1996; Gately, Cooke, Butterly, Knight, Carroll, 2000; Greger & Edwin, 2001; Lowry, Wechsler, Galuska, Fulton, & Kann, 2002; Smith, 1997; and Sothern, Schumacher, von Almer, Carlisle, & Udall, 2002). Other studies regarding solutions to youth obesity have examined the behavioral change components such as the role of perception of choice, behavior contracting (changing a healthy behavior equals earning a desired activity), self-monitoring of food intake, and praise.

The purpose of this exploratory study was to determine whether or not there was a difference in measured outcomes of weight loss, fat-mass decrease, inches lost and improved body image based on the social influence of participants and participation in a health/exercise program within controlled groups. The study examined the differences in outcome dependent upon the following groups: a peer only group and a youth/parent group that received education and participated in an exercise program vs. a control group who did not. The program used exercise circuit-training, health education (goal setting, nutrition, and stress management) and body image improvement. This particular model was chosen because of ease of duplication
and minimal cost of implementation. In addition, the program could easily be replicated in many community settings (church, school, and community centers) with little equipment or training expense. This proactive approach provides a model that begins to address the problem of youth obesity using cost-effective strategies that work.

Consequences of Obesity

Numerous negative consequences are associated with obesity in children. The physical problems as well as the psychosocial problems can range from problematic to lethal. Not only are the problems associated with the child’s direct health, but also with the child’s overall psychological functioning in society. Understanding the negative impact can assist in devising effective interventions.

Physiological Consequences

Obesity in youth is associated with an increased risk for a number of medical morbidities including cardiovascular disorders and diabetes. The incidence of these disorders has risen alarmingly in children over the last 20 years (Dietz, 2004). The National Heart, Lung, and Blood Institute (2002) lists dyslipidemia, high blood pressure, acanthosis nigricans, increased left ventricular mass, sleep apnea leading to fatigue, slipped capital femoral epiphysis, and type II Diabetes as complications directly related to obesity. Type II Diabetes is now seen in dramatically increasing rates in children 10-15 years old, unheard of even 10 years ago. In addition, certain
types of cancer in adults such as breast, colon and prostrate have been linked to long standing obesity beginning in adolescence (American College of Sports Medicine, 2003a; Sondike et al., 2000). Therefore, the prevention of obesity in youth promotes both quality and longevity of life.

**Psychosocial Consequences**

There are numerous social prejudices for overweight adolescents between the ages of 12-14 that contribute to school/social functioning (Dietz, 1998; Swallen, Reigher, Haas, & Meier, 2005). Adolescent girls who are overweight experience social stigmatization from people they know and from strangers. Overweight youth tend to be taller, which makes them appear older than their actual chronological age. Because these youth appear to be older, adults may place unrealistic expectations upon them. This can lead to frustration in the child for not being able to meet those demands and may foster inadequacy as well (The American Obesity Association, 2002). Other stereotypes with which overweight youth have to cope with are being lazy, lacking emotional feeling, and having poor grooming habits.

Obesity also can cause a poor body image due to some of the social prejudices to which adolescents are exposed. Body image, as defined by the American College of Sports Medicine (2003b, para. 3), “is a combination of how one’s body feels to them and the person’s perception of their body.... body image issues are reaching a crisis level and impacting the health of children.” A new disorder, “body dysmorphia,” has been reported by the American College of Sports Medicine (2003b)
in which a person is dissatisfied with his/her musculature. A negative body image therefore, is often a misperception or distortion, not one necessarily based on fact.

Body image and other related psychological issues such as depression, low self-esteem, and body dissatisfaction have been influenced by both interpersonal prejudice and discrimination associated with obesity in a culture that has a preoccupation with thinness (Dunkley, Wertheim, & Paxton, 2000; Greger & Edwin, 2001). A longitudinal study was conducted by Dunkley and colleagues among 496 adolescent girls to assess their level of body dissatisfaction. Self-report questionnaires addressed social/cultural issues including media and peer/parent influence. Additionally, questionnaires to assess perception of body image using female figures (very thin to obese) were rated and used along with the Body Attitudes Questionnaire. Direct weight and height measurements were taken as well. The study found that elevated body fat and societal pressure to be thin were factors that contributed to a poor body image.

**Treatment Options for Obesity**

A variety of treatments for obesity have been researched. Numerous variables such as physical activity, dietary changes and social influences have been used in various combinations to assess effectiveness. The research conducted by this exploratory study looked specifically at the social influence as well as the physical components affecting adolescents in an obesity treatment program.
Physical Activity

Without the adoption of a lifelong interest in regular physical activity, children risk diseases associated with sedentary lifestyles such as obesity (Matheson, 2001). Physical activity is considered one of the key components in treating childhood obesity and is one of the major determinants of overall health. Physical activity is broadly defined and may range from organized formal sports to fitness activities such as aerobics and weight training to leisure activities such as walking, biking and dancing.

Physical activity is the most viable option for treating obesity. Sondike and colleagues stated, “An increase in physical activity is crucial to any weight-loss program. Exercise improves some of the conditions that foster overweight....and raises a low basal metabolic rate...Exercise also preserves lean-muscle mass...” (2000, p.144). Moreover, according to the Aerobics and Fitness Association of America (1995), circuit training specifically improves cardiovascular fitness and reduces body fat. These outcomes are due to the strength-training component that directly builds lean muscle mass. Additionally, the American College of Sports Medicine (1995) reports that modest improvements in cardiorespiratory fitness and reductions in body fat can be directly attributed to circuit training. “Circuit training is a method of resistance training in which a series of exercises are performed in succession with minimal rest between exercises” (p. 173). In addition, Lewis (2001)
recommended offering a welcoming environment for all ages and fitness levels that was neither threatening nor competitive.

The Growth and Health Study explored longitudinal changes in physical activity in a biracial cohort during adolescence that originated from the National Heart, Lung, and Blood Institute (2005). The 2,379, 9 and 10 year-old participants were from different school districts around the country. This group was followed annually until the participants were 18 to 19 years old. The results demonstrated that during the ages of 9 to 16 years, there were significant declines in physical activity.

The ages 12 to 15 are important for two different reasons. First, adolescent changes in this age group are occurring most rapidly. Secondly, Telama and Yang (2000) noted that most of the overall physical activity decline occurred between ages 12 to 18 for male subjects and ages 12 to 15 for female subjects. Therefore, interventions during early adolescence are crucial to establishing a healthy lifestyle vs. a sedentary one.

None of the studies reviewed explored whether the exercise/health program designs and outcomes could be affected by the actual social composition of the participants, particularly comparing a group of peers vs. a group of youth with parents. The main focus of most of the studies was on dietary changes, aerobic exercise, weight training exercise, and various combinations of the aforementioned. Combining circuit training, which involved aerobic and weight training segments, and
education in the social culture of peers alone vs. parents/teens has not been widely
explored.

**Dietary Modifications**

The other variable in treating obesity is dietary modification. Reduced

caloric foods specifically for weight loss abound in the food market and account for

millions of dollars spent by Americans. The use of this variable is not exclusive to

the adult population. It is reported that dieting behaviors start as early as 9 years old

and that 44% of high school girls are dieting at any one time (Birch & Fisher, 1998).

Moreover, early dieting in youth is a risk factor for developing obesity. By focusing

on controlling food intake, a person loses the ability to develop satiety cues. This can

lead to skipping meals and an obsession with what might be considered “forbidden

foods.” Focusing on food can also lead to binge eating as a result of feeling deprived.

Interventions for youth recommend that they eat a wide variety of nutritious food and

modify eating habits by portion control and minimizing intake of highly caloric foods

(Birch & Fisher, 1998).

Using dietary methods to reduce obesity in youth should first focus on weight

stabilization and then reduction. Because it is important for youth to maintain linear

growth, it is healthier for them to grow into their weight rather than experience a

sudden loss in weight. Therefore, dietary strategies that control portion size and

reduce soft drink and juice consumption are prudent measures for obese youth

(Greger & Edwin, 2001). Aggressive diets also may be problematic. Westcott and
Faigenbaum (2001) stated "the two tactics most often employed for overweight adults—dieting and endurance exercise—are less likely to be effective for obese children" (p. 29). Again, an effective program for youth must be comprehensive and specific to the needs of children and adolescents.

**Combination Programs**

Epstein and Goldfield (1999) conducted a meta-analysis that investigated the role of exercise in the treatment of obese adolescents and used computer databases including Medline and PsychInfo that were accessed from January 1966 through November 1998. Thirteen studies met the criteria for randomized exercise programs and/or demographic and body measurement variables for obese youth. Also, these programs met the criteria of lasting at least 2 months. The studies were divided into three groups. The first group of studies assessed exercise vs. no exercise without any dietary modifications. The second group of studies compared exercise combined with dietary modifications vs. dietary modifications alone. The third group of studies looked only at the effects of different exercise. The results demonstrated that exercise alone produced modest weight loss as well as long-term maintenance of weight loss. The second group of studies (exercise and diet vs. diet alone) did not reveal any significant changes in body fat. The third group of studies resulted in recommendations that more research be conducted to determine the effect of different types of exercise that reduced youth obesity.
Social Influences

In addition to individual behaviors such as poor dietary habits and the lack of physical activity, other social impacts such as parents and peers significantly affect adolescent behaviors. Regarding adolescent eating and physical activity behaviors, Baker (2001) stated that social norms indirectly impact attitude. He indicated that “Examining the unique impact of specific social influences (i.e., parents versus peers separately) provided additional information over testing social influences as an aggregate group” (p.1). Whether one or the other might have a greater impact on weight and body image issues is unclear.

Social influence is the real or imagined pressure to modify one's behaviors, attitudes or beliefs (Alock, Carment, & Sadava, 1991, p. 264). Social support is probably the most important social influence regarding the modification of exercise behavior. Social support refers to the perceived "comfort, caring, assistance, and information that a person receives from others" (Lox, Martin, & Petruzello, 2003, p. 264). According to Lox and colleagues, there are five main types of social support that serve different functions as they apply in the exercise setting. Instrumental support involves providing the every day assistance with tasks that would allow a person to engage in exercise. Emotional support encourages the individual to work harder and feel cared for as they engage in exercise. Emotional support serves to enhance self-esteem and reduce anxiety. Informational support provides the "how to's" or facts that offer tips in maintaining an active lifestyle. Suggestions may
include how to exercise, progress in meeting goals, and additional healthful information. Companionship support increases the enjoyment of the activity by providing fellowship in the exercise activity. Buddy systems often distract the feelings of fatigue, pain and boredom. Validation support allows the exerciser to make comparisons with others to confirm that what they are feeling is normal and is shared within the group. Many people with chronic health conditions such as obesity say the exercising in groups similar to themselves gives them a feeling "if they can do it, so can I" (Lox et al., p. 265).

Group makeup is one aspect along with group composition and group size that served to influence exercise related behavior. The fewer the number of people in an exercise the more positive the perception of group cohesiveness (Carron & Spink, 1995) and exercise satisfaction (Carron, Brawley & Widmeyer, 1990). Group size also improves the perception of instructor effectiveness as participants expect and receive more individual attention. Group composition is also influenced by similarity of participants. Obese people indicate they prefer to exercise in groups of other obese people (Bain, Wilson, & Chaikind, 1989).

**Parental Influence**

Social support from parents and other family members has been identified as one of the most important determinants in children's activity levels because parents can provide so many different types of support. Sallis, Prochaska, Taylor, Hill, and Geraci (1999) found that family support was one of the strongest predictors for both
boys' and girls' level of physical activity at all grade levels. The American College of Sport’s Medicine (2003) stated that parental influence could help toward establishing a healthy body image in children.

The researchers in a study regarding genetic and environmental factors in physical activity levels within families (Simeonen et al., 2002) stated that there have been regular inconsistencies in different studies ranging from low to high correlations between familial physical activity levels. The data collected looked at several different measures and analyses. A questionnaire was also used to assess activity levels from the previous year. The results revealed that there was a contribution from both heredity and environment regarding physical activity levels in families. The highest significant degree of genetic/heredity influence was regarding physical inactivity. Simeonen and colleagues found that parental influence explained almost as much of the variation in exercise habits as did peer influence. This particular study, however, looked at adult children in their twenties and not at adolescents.

A study on physical activity as a determinant of activity level and patterns of activity in obese children (Kalakanis, Goldfield, Palucj & Epstein, 2001) was prompted by the rise of childhood obesity and the prevention of obesity by moderate-to-vigorous physical activity (MVPA). Seventy-one families were initially screened to participate in a family-based weight control program offered by the University of Buffalo. Children who participated in this study met criteria of height and weight measurements of greater than 85% BMI. Demographics were taken including age,
gender and economic status. The results for the physical activity portion of the study revealed that the parent’s physical activity levels (which were also recorded) directly affected their children’s level of activity. In addition, the parents had more of an impact on their child’s physical activity than age, gender or socioeconomic status.

Family-based interventions for high-risk children have been more successful than for healthy families. Behaviorally oriented family-based treatments that include training, weight reduction skills and reinforcement for adult behavior are the most effective interventions for obese children (Epstein, Wing, Koeske & Valoski, 1985; Israel, Stolmaker & Andrian, 1985). Family-based diet and physical activity for obese children led to weight loss that was maintained for a 10-year period (Epstein, McCurley, Wing, & Valoski, 1990). Hildebrandt (2003) was in favor of family support in the treatment of pediatric obesity as stated in her presentation on Intervention Strategies in Pediatric Obesity Treatment in Cadillac, Michigan. Finally, the Centers for Disease Control and Prevention (2002) stated that it is very important to involve the family in physical activities of their children. In summary, opportunities for the motivation to be physically active begin in the home.

Epstein (1996) noted that parenting styles could reinforce and model poor dietary choices and sedentary lifestyles. He suggested that parents be involved in encouraging and reinforcing healthier lifestyles in order to achieve a more normal weight. He presented a social reinforcement model (regulated by the parents) using praise and contracting. Negotiation and significant others become a more important
source of influence than parental nagging, sanctions and discouragement (Dishman, 1994).

The direct social support of parents seems less influential as the child matures. As children mature, particularly during adolescence, parental influence weakens as peers and other personal and environmental factors become influential. There is a stronger association between parental and child behaviors than between parental and adolescence behaviors (Godin & Shephard, 1986).

**Peer Influence**

Adolescent peer relationships have a significant impact on physical activity compliance among adolescents. This concept was examined in a dissertation (Smith, 1997) that focused mostly on the psychological perspective in peer relationships regarding physical activity. The dissertation titled "Peer Relationship and Physical Activity Participation in Early Adolescence" described three aspects of physical activity: (a) the participant's response to activity, (b) the motivation for activity and (c) self-worth regarding activity. The model that was being tested regarding the three different aspects was Harter's theoretical perspective on motivation. The assumption of that model was that peer relationships would have a positive influence on a person's beliefs about whether one can succeed in a specific situation and be motivated by feelings of competence.
In the actual study conducted by Smith (1997), 418 male and female participants between the ages of 12-15 years old were given a questionnaire that assessed the important aspects of Harter’s model. The results of the study confirmed Harter’s theoretical perspective that peer relationships influenced motivation to participate in physical activity in both male and female adolescents (Smith, 1997).

Peers may provide different types of social support than parents. In a study of adolescents, influences of best friend were more highly associated with physical activity than parental influence (Anderssen & Wolb, 1992). Rather than providing instrumental, informational and emotional support given by parents (Kohl, 1998), peers are more likely offering companionship and validation.

**METHOD**

The purpose of this exploratory study is to determine whether there was a difference in measured outcomes of weight loss, fat-mass decrease, inches lost and improved body image based on the social influence on participants and participation in a health/exercise program within three groups. The study examined the differences in outcomes dependent upon a peer only group and youth/parent group, both of which received education and participated in an exercise program. The control group did not.

**Sample**

There were 18 subjects in the study configured into three groups of six. One group consisted of teens only and the other group consisted of teens and one parent.
each. The third group was the control and did not participate in the exercise or health lecture program but was measured at the start and finish of the eight weeks. All control participants received educational materials at the end of the study. There was a 100% completion of all participants involved in the study.

The parent/youth group (PYG) consisted of three Caucasian females and three Caucasian males and their parents. The peer group (PG) consisted of two Caucasian females, three African-American females, and one Caucasian male. The control group (CG) consisted of four Caucasian females, one African American female, and one Caucasian male. The ages and gender of youth in the parent/youth group were one 12-year-old male, a 13-year old male and a 13-year old female, one 14-year old male, and two 15-year old females. The ages and gender in the peer group were four 12-year-old females, one 15-year-old female and male. The ages and gender for the control group were one 12-year-old female, two 13-year-old females, one 14-year-old male, and two 15-year-old females. (See Table 1.)

[Insert Table 1]

**Measures**

**Measure of Circumference**

One instrument used for the circumference measurements (to determine loss of inches) included a tension-regulated metal tape. Body circumference was measured at the following seven different girth sites: (a) waist, the narrowest part of the torso,
(b) abdomen, around the umbilicus, (c) hips, around the maximum extension of buttocks, (d) thigh, the very top of the thigh, (e) calf, maximal girth of calf, (f) arm, halfway between the acromion process and olecranon process, and (g) forearm, maximum part of the forearm.

**Measure of Body Fat**

The Lange Skin Fold Caliper is an instrument used to measure body fat based on the thickness of skin folds by separating body fat from muscle underneath the skin. According to Nieman (1995), the Lange is highly recommended and used by many U.S. researchers to develop their prediction equations and norm tables. All measurements are taken on the right side at the medial calf and triceps. The calipers were placed 1 cm from the thumb and forefinger perpendicular to the skin fold, and halfway between the crest and base of the fold. Two measurements were taken at each site with the rotation through the measurement sites remaining in the same order so that the skin has time to regain normal texture and thickness. If there was a discrepancy of more than 2 millimeters, a third measurement was taken (American College of Sports Medicine, 1995). These tests were performed in such a way that privacy is insured for the person being measured.

**Measure of Weight**

The scale used to measure weight in pounds was a Health-O-Meter physician gauge digital scale.
Measure of Perceived Exertion

The definition of perceived exertion is a rate that measures how tired a person feels overall during physical activity. The Omni Rate of Perceived Exertion Scale (ORPES) was used to measure perceived exertion for youth developed by Robertson (2004). The reliability of the Omni scale were conducted by Pfeiffer, Pivarnik, Womack, Reeves, & Malina (2002) and found coefficients ranged from $r = 0.91$ to 0.95. This scale was found to be a superior scale to the Borg when used with adolescent girls. Furthermore, it was shown to be a valid tool in assessing rate of perceived exertion for children in regard to exercises.

Rate of perceived exertion is measured on a scale of 1 to 10. For this study, the work effort was rated between 2 to 5 using the ORPES guidelines. During the first session of the program, the ORPES chart was passed out to all participants in the programs that received the health/exercise program except the control group.

An explanation occurred describing the correlation between the numbers on the scale and level of workout intensity. Two to five were light/moderate intensity levels. The verbal anchoring was the words on the picture that corresponded to the workload on the picture. Additional information consisted of explaining that 0 represents "not feeling tired at all" with 10 being "totally tired" after a very hard workout. A rating of 2 to 5 was similar to the beginning of "walking up a small hill" where the subject would either be a little tired or getting tired more. There was practice and feedback on using the scale during the exercise sessions.
Measure of Body Image

The Multidimensional Body-Self Relations Questionnaire (MBSRQ) was used to measure body image (Cash, 2000). According to Duda (1998), MBSRQ is the most comprehensive and psychometrically studied cognitive assessment of body image. The reliability ranges of the measures scales were $r = .79-.90$ and the test-retest reliability over 2 weeks was $r = .78-.94$. Additionally, the instrument is intended for use with adults and adolescents. It also has been validated with males, which provides a higher external validity. The MBSRQ consists of 34 questions and five scales.

Appearance Evaluation

This measures feelings of physical attractiveness or unattractiveness; or satisfaction or dissatisfaction with one’s looks. High scorers feel mostly positive and satisfied with their appearance; low scorers have a general unhappiness with their physical appearance.

Appearance Orientation

This measures the extent of investment in one’s appearance. High scorers place more importance on how they look, pay attention to their appearance, and engage in extensive grooming behaviors. Low scorers are apathetic about their appearance; their looks are not especially important and they do not expend much effort to "look good".


Overweight Preoccupation

This is a scale that assesses a construct reflecting fat anxiety, weight vigilance, dieting, and eating restraint or could be considered an obsession with weight.

Self-Classified Weight

This measures how one perceives and labels one’s weight, from very underweight to very overweight.

Body Areas Satisfaction Scale (BASS)

This measures satisfaction with discrete aspects of one’s appearance. High composite scorers are generally content with most areas of their body. Low scorers are unhappy with the size or appearance of several areas.

PROCEDURES

Flyers were posted at different pediatrician sites to recruit participants. Advertisements were also placed in the local newspaper inviting interested participants. Interested participants responding to the in-office flyer were encouraged to ask for more information by discussing it briefly with a physician/care provider. In addition, physicians who had previously responded to weight issue concerns contacted those patients to notify them of the study. Those patients/parents who expressed an interest to the physicians were then directed to contact the investigator by phone. It was emphasized that participation was voluntary and free to those interested.
Upon contacting the investigator, potential participants were told that the research would involve eight consecutive segments meeting for 90 minutes each time. The expectations regarding the program were that they were to attend all sessions as well as perform extra physical activity twice a week for 20 to 30 minutes outside of class. It was emphasized that there was a one chance in three of being assigned to the control group who would not receive the treatment program. However, the control group participants received all of the educational handouts and a token gift (a diary) at the end of the 8 weeks. At the first session, teens were assigned to the groups’ dependent upon alphabetical order in a list. Participants were told they could drop out if dissatisfied with group selection. All 18 participants, regardless of group assignment, received a token gift (a diary) for completion of the program.

Institutional Review Boards

Western Michigan University Human Study Institutional Review Board conducted a review of the study and scheduled an interview with the investigators on May 19, 2004. There were some changes that needed to be made for final approval. Two different drafts were submitted before the final approval was granted on August 11, 2004.

Bronson Methodist Hospital Institutional Review Board, where the program was conducted, also reviewed the study design and procedure. Their full institutional
Review Board met on July 8, 2004 and granted their consent pending changes. The final changes were approved August 10, 2004.

**Intervention**

The intervention involved eight, 90-minute sessions including 45 minutes of exercise and 45 minutes of health education. The sessions were conducted on a weekly basis for 8 consecutive weeks.

**Physical Exercise Component**

The exercise component consisted of a circuit workout in groups and individual self-reported exercise sessions.

**Circuit workout**

The circuit workout combined light/moderate strength-training segments focusing on the major muscle groups combined with light/moderate floor aerobic training. Both strength training and aerobic segments lasted 90 seconds each. The first 90 seconds was aerobics followed by 90 seconds at a strength station and so on for 45 minutes.

Eight strength-training stations were set up identifying the specific muscle group being worked. Some of the movements were multi-jointed and complex; others were single jointed and simple. The different muscle groups worked were hamstrings, quadriceps, glutei's, pectorals, trapeziums, rhomboids, biceps, triceps,
and deltoids. Exertubes were used for strength training and resistance. The participants performed as much strength training (safely and correctly) as they could within the allotted amount of time. If they were reaching fatigue, they were instructed to slow down or stop.

The aerobic portion of the segment involved basic Hi/Low aerobic moves. For the people who had sedentary or low fitness levels, RPE’s ranging from 2 to 5 was selected to minimize health risk. If participants chose to work higher than an RPE of 5, they were instructed that they could continue at that level as long as they could talk and not be short of breath. Plus, when a person became fatigued they were instructed to stop and just march in place until they were able to catch their breath and talk without being winded. The participants were closely monitored. The purpose of the study was to reduce body fat; therefore, the RPE was chosen to help achieve that goal. The student investigator properly monitored each station. A pediatrician was also available during the sessions, on call as needed.

**Self-reported Exercise**

In addition to the exercise performed in the class, the participants needed to exercise an additional continuous 20 to 30 minutes at light/moderate intensity on their own twice a week. Examples of what type of exercises would qualify were addressed the first night of class by the student investigator. The participants discussed as a group which activities were acceptable that they had selected to do in the upcoming weeks.
Health Education Component

The health education segments involved stress management, goal setting, nutrition, awareness of eating cues, pubertal body changes/body types (endomorph, ectomorph, and mesomorph), and self-esteem. The design of this segment included interactive discussion, diagramming, writing, illustrating and lecture by the student investigator and the pediatrician. (See Appendix A.)

RESEARCH DESIGN

The study utilized the true experimental design consisting of pretest-posttest randomized-groups depicted below. The R stands for the randomization of participants into their groups. The T stands for Treatment that was the conduct of the exercise/health program.

R 0₁ T 0₂ Parent/youth
R 0₃ T 0₄ Peer
R 0₅ 0₆ Control Group

The observations 0₁ and 0₂ were conducted in the group who had parent/youth participants for the treatment. The observations 0₃ and 0₄ were conducted in the group who had peer participants. The observations 0₅ and 0₆ were conducted in the adolescents who did not receive the treatment and are the control group. There were a total of 6 participants in each group and totaling 18.
Analyses

Statistical Analysis

The statistical technique utilized was the analysis of variance (ANOVA) with a 3 x 2 factorial or a three-way factorial with repeated measures. The analyses attempted to provide statistical significance between the pretest and the posttest in each of the three groups as well as prove a significant difference among the three groups. Statistical Package for Social Sciences (SPSS), Version 12 software was used for data analysis. Hypotheses were tested using a factorial-repeated measure ANOVA. Significance was determined at the $p < .05$ level.

RESULTS

Fat Mass

The mean number of millimeters of fat mass lost for each group is shown in Table 2. The PYG's pretest mean for fat mass was 52.17 millimeters (mm) and posttest mean was 44.28 mm with a total loss of 7.69 mm. The PG’s pretest mean for fat mass was 56.67 mm and posttest mean was 48.08 mm with a total loss of 8.59 mm. The CG’s pretest mean for fat mass was 63.08 mm and posttest mean was 65.42 mm with a total gain of 2.34 mm. A one-way repeated measures ANOVA was calculated comparing the scores on fat mass among the three groups. A significant effect was found, $F(2, 17) = 10.68$, $p < .001$. Follow up protected t tests revealed that there is a significant difference in fat mass means between PYG and CG ($m = 10.44$, $sd = 5.25$). There was also a significant difference between PG and CG means ($m =$
10.91, \( sd = 5.9 \)). There was no significant difference however between PYG and PG means \((m = -0.47, s = 8.87)\). There was a significant difference in fat mass between the pretest mean and the posttest mean for groups participating in the exercise program and the CG that did not, \( F(1) = 19.06, p = .01 \). Outcomes of total fat mass lost or gained per group were as follows: the PYG lost 47.53 mm, the PG lost 51.51 mm and the CG gained 39.25 mm (see Tables 2 and 3).

**Body Weight**

The PYG body weight started at a pretest mean of 199.2 lbs. and ended at a posttest mean of 200.7 lbs. with a gain of 1.5 lbs. The PG body weight started at a pretest mean of 217.7 lbs. and ended at a posttest mean of 217.3 lbs. with a loss of .4 lbs. The CG body weight started at a pretest mean of 233.3 lbs. and ended at a posttest mean of 236.4 lbs. with a gain of 3.1 lbs. (See Table 2.) Analysis of Variance (ANOVA) on body weight indicates that there is no significant difference among the three groups, \( F(2, 17) = 2.02, p = 0.15 \). Regarding the outcomes of total weight lost or gained per group the PYG gained 9 lbs., the PG lost 3 lbs and the CG gained 19 lbs. (see Table 3).

**Body Circumference**

The PYG started at a body circumference pretest mean of 230.5 inches and ended at a posttest mean of 228.9 inches with a loss of 1.6 inches. The PG started at a body circumference pretest mean of 242.4 inches and ended at a posttest mean of
239.1 inches with a loss of 3.3 inches. The CG started at a body circumference pretest mean of 253 inches and ended at a posttest mean of 253.8 inches with a gain of .8 inches. (See Table 2.) Analysis of Variance (ANOVA) on body circumference indicates no significant difference among the three groups, $F(2, 17) = 1.12, p = .35$. Regarding the outcomes of total body circumference measurements lost per group the PYG lost 9.75 inches, the PG lost 19.88 inches and the CG lost 1.38 inches. (See Table 3.)

**Overall Body Image**

The PYG started at a pretest mean of 16.51 and ended at a posttest mean of 17.30 with a gain of 0.8. The PG started at a pretest mean of 16.53 and ended at a posttest mean of 17.20 with a gain of 0.67. The CG started at a pretest mean of 16.85 and ended at a posttest mean of 16.43 with a loss of 0.42. A one way repeated measures ANOVA was calculated comparing the scores on body image among the three groups. No significant difference was found, $F(2, 17) = .29, p = .76$ (see Table 4.)

No significant difference exists among body image mean for PYG ($m = 16.51, sd = 1.18$), PG ($m = 16.53, sd = 1.16$), and CG ($m = 16.85, sd = 1.18$). A one way repeated measure ANOVA was calculated comparing the scores on body image. There was no significant difference in body image between the pretest mean and post test mean between exercise program participants and the CG, $F(1) = 0.45, p = .53$. No
significant difference exists between the pretest mean ($m = 16.52, sd = 1.16$) and posttest mean ($m = 16.45, sd = 1.51$). Regarding the total overall body image lost or gained per group the PYG gained a total of 0.82, the PG gained 0.91, and the CG lost only 1.34 (See Table 5.)

**Appearance Evaluation**

The PYG started at a pretest mean of 2.71 and ended at a posttest mean of 3.50 with a gain of 0.79. The PG started at a pretest mean of 2.62 and ended at a posttest mean of 3.21 with a gain of 0.59. The CG started at a pretest mean of 2.33 and ended at a posttest mean of 2.62 with a gain of 0.29. The norms according to Cash (2000) are for males mean 3.49 and a SD of .83 and for females mean 3.36 and a SD of . 87. Analysis of Variance (ANOVA) on appearance evaluation indicates there is not a significant difference among the three groups, $F (2, 17) = 2.28, p = .13$. (See Table 4.) Regarding the total appearance evaluation lost or gained per group the PYG gained a total of 0.79, the PG gained 0.59, and the CG gained only 0.29. (See Table 5.)

**Appearance Orientation**

The PYG started at a pretest mean of 3.69 and ended at a posttest mean of 3.75 with a gain of 0.06. The PG started at a pretest mean of 3.82 and ended at posttest mean of 3.71 with a loss of 0.11. The CG started at a pretest mean of 4.08 and ended at a posttest mean of 3.90 with a loss of 0.18. The norms according to Cash (2000) are for males mean 3.60 and a SD of .68 and for females mean 3.91 and
a SD of .60. Analysis of Variance (ANOVA) on appearance orientation indicates there is not a significant difference among the three groups (see Table 4), $F(2, 17) = .51, p = .61$. Regarding the total of appearance orientation measurements lost or gained per group the PYG lost 0.25, the PG lost 0.11, and the CG lost 0.52 (see Table 5.)

**Body Area Satisfaction Scale**

The PYG started at a pretest mean of 2.98 and ended at 3.43 with a gain of 0.45. The PG started at a pretest mean of 2.59 and ended at a posttest mean of 2.99 with a gain of 0.40. The CG started at 2.68 and ended at a posttest mean of 2.73 with a gain of 0.05. (See Table 4.) The norms according to Cash (2000) are for males mean 3.50 and a SD of .63 and for females mean 3.23 and a SD of .74. Analysis of Variance (ANOVA) on body area satisfaction scale indicates there is not a significant difference among the three groups, $F(2, 17) = 2.06, p = .15$. (See Table 4.) Regarding the totals of body area satisfaction scale measurements lost or gained per group the PYG gained 0.45, the PG gained 0.40, and the CG gained 0.05. (See Table 5.)

**Overweight Preoccupation**

The PYG started at a pretest mean of 3.17 and ended at a posttest mean of 2.96 with a loss of 0.21. The PG started at a pretest mean of 3.08 and ended at posttest mean of 2.96 with a loss of 0.12. The CG started at a pretest mean of 3.42 and ended at a posttest mean of 3.17 with a loss of 0.31. The norms according to Cash (2000) are for males mean 2.47 and a SD of .92 and for females mean 3.03 and
a SD of .96. Analysis of Variance (ANOVA) on overweight preoccupation indicates that there is no a significant difference among the three groups, $F(2, 17) = .41, p = .67$. (See Table 4.) Regarding the total of overweight preoccupation measurements lost or gained per group the PYG gained 0.12, the PG gained 0.12, and CG lost 0.41. (See Table 5.)

**Self-Classified Weight**

The PYG started at a pretest mean of 3.96 and ended at a posttest mean of 3.67 with a loss of 0.29. The PG started at a pretest mean of 4.42 and ended at a posttest mean of 4.33 with a loss of 0.09. The CG started at a pretest mean of 4.33 and ended at a posttest mean of 3.58 with a loss of 0.75. The norms according to Cash (2000) are for males mean 2.96 and a SD of .62 and for females mean 3.57 and a SD of .73. Analysis of Variance (ANOVA) on self-classified weight indicates no significant difference among the three groups, $F (2, 17) = 1.89, p = 0.17$. (See Table 4.) Regarding the total of self-classified weight measurements lost or gained per group the PYG lost 0.29, the PG lost 0.09, and the CG lost 0.75. (See Table 5.)

**DISCUSSION AND RECOMMENDATIONS**

Because the problem of obesity in the United States has reached epidemic proportions a research program to reduce body-fat for youth has been conducted. The outcome of this exploratory study shows improvement among participants in a group of all peers vs. parent/youth. This improvement is however not statistically significant. When assessing body-fat reduction and inches lost, the exercise and
health education program is effective in helping the teens lose inches and body fat regardless of their weight loss. The attending pediatrician for this study noted that in obese youth, weight stabilization as opposed to weight loss is clinically significant as this age group has not always completed pubertal growth.

Program impact in this exploratory study suggest that the parent/youth group gained 9 lbs. while at the same time losing almost 10 inches and losing 47 mm of fat mass. (See Table 3.) The weight gain noted in this group could have resulted from the significant male representation in the group. This was the only group that had male subjects comprise half of its participants. Because adolescent males gain more lean muscle mass vs. body fat, this may have accounted for an increase in weight gain and inches lost due to higher concentrations of testosterone found in males.

Another variable of focus in the research was the social dynamics of the two groups involved in the intervention. The social support literature suggests the group composition influenced the two groups differently. The peer group frequently laughed and joked and displayed such high energy levels indicative of emotional support and companionship. The peer group consistently wanted to move to higher RPE’s and encouraged each other to do more. Also, the peer group demonstrated a high level of exercise self-efficacy as exhibited by completing the extra exercise components outside of the group time that is indicative of validation support. The peer group participants showed more motivation, support for one another, and better outcomes as observed by both the investigator and pediatrician.
As for demographics, the peer only group which consisted of five females, three of whom were of African American descent was the only group that lost weight (3 lbs.). They lost the most inches (20) and the most fat mass (51.51 mm). There was a substantial loss compared to the other two groups in all three physical outcomes even though statistical analysis does not indicate significance.

Those youth who participated in the intervention with their parents were more subdued and did not exhibit the same enthusiasm and teamwork towards each other. The lower levels of exercise self-efficacy at times were demonstrated as some of the parents took it upon themselves to monitor the exercise levels of their children. There was minimum encouragement among the peers in this group as compared to the peers in the peer group. At times, during some of the health education components, the parents did almost all the talking during the discussion components indicative of informational support. Furthermore, the youth in this group did not complete all of the required exercising outside of class. Despite parent participation, adolescents did not receive the instrumental support necessary to be successful in weight loss.

The control group showed the most weight gain of all the groups as they did not actively participate in the program. Their activity level and dietary modifications were unknown. However, many in the control group reported to the investigator that as a result of being measured and weighed, they started their own exercise and diet modifications. This suggests that the Hawthorne effect also might have had an impact with the control group engaging in those activities as a conscious effort to not
“look bad” in the study. The "Hawthorne effect occurs when the feeling of being studied causes the participant to take action" (Parson, 1974, p. 430.)

The informational support provided in the Health/Exercise program may have made a difference in regards to overall body image, the two groups that participated in the program showed gains (not statistically significant) whereas the control group did not. The parent/youth group gained an overall 0.82, the peer group gained an overall 0.91 and the control group lost an overall 1.34. The program seemed to have shown potential for improving body image among obese adolescents regardless of gender or race. This may be due to the social support offered in the educational component, encouragement of the investigator and pediatrician or due to the social dynamics of the group. The control group did not have interactions with each other and minimal contact with the investigator and pediatrician.

The program intervention made a significant impact on fat mass. Social influence appears to make clinically observable impact on fat mass and body image for the participants who received the intervention. Social support of the peers appears to show significant potential which may have yielded greater results in loss of fat mass, weight, and circumference measurements among the peers who did not have parent participation. Follow-up research with a longer time period and a larger number of participants is needed to further explore this model. Despite the previous assumptions that parent influence is “paramount”; this exploratory study suggests that the influence of peers in a select group (all obese) has potential for making a
The parental support given to the participants in the parent/youth group appears to have a limiting factor for the adolescents regarding physical changes in the youth.

It is the opinion of the investigator and the attending pediatrician and one expressed by group participants that it was much easier to discuss obesity, body image, self-esteem and to exercise with others in this study. This was because all of the participants met the BMI criteria for obesity. This seemed to minimize social anxiety although this was not a measured outcome but it is also supported by validation support and the "if they can do it, so can I" theory (Lox et al., 2003.)

Results of this study support that this group environment may be an effective tool for treating obese adolescents. Other variables such as the consideration of cultural factors, ethnicity and gender might improve outcomes as well. Cultural differences were not addressed in this present study. “Differences in body image and weight-related concerns between black and white girls have been observed. In general, black girls and women report less social pressure to be thin.” (NHLIB, 2002, para. 3.) One of the recommendations of this study is that in the future gender and ethnicity be explored as separate variables and groups matched to control these separate effects.

The results of this study reflect the need to explore more thoroughly the independent variables such as social influence and exercise program components.
Also, there needs to be at least a one year follow-up to test the long-term results of social influence and effectiveness of the exercise program.

The researchers would recommend avoiding the Christmas holiday season. One of the problems encountered was exposure to holiday foods. Despite this, there was a measure of success.

Future studies should include measurement of height in addition to weight for both pre and post assessments. This would account for the influence of potential pubertal growth spurts. The growth spurts might skew the results as weight might be proportional to height gain. Height was not a measurement in this study. The BMI initially was determined by self-screening (using a chart) or by physician screening. Another limiting factor pertaining to study design was the pubertal stage of the participants. Because of changes during puberty, there may be large fluctuations in fat mass at any one time. This could be controlled for in future studies by determining participants Tanner Stage (a measure of pubertal maturity).

The control group had a limiting factor since some of the participants began to diet and workout on their own as reported to the investigator. The changes in their food consumption as well as an increase in their physical activity level may have had a direct impact on body fat, weight, circumference measurements and body image issues.

Although this exploratory study was small and did not control for several variables such as gender, ethnicity, and pubertal state, it suggests that better outcomes
are achieved in a program in which participants are peers and all are obese. This aspect of the study was not anticipated but is important when designing programs especially in settings where obese children may not want to be identified as such. Voluntary community settings might be viewed as less threatening.
BIBLIOGRAPHY


Carron, A.V., Brawley, L.R., & Widmeyer, W.N. (1990). The impact of group size
in an exercise setting. *Journal of Sport and Exercise Psychology, 12, 376-387.*


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*Note: PYG=Parent Youth; PG=Peer Group; CG=Control Group
Table 2

Descriptive Statistics and ANOVA Results for Group Measures of Fat Mass, Body Weight, and Body Circumference Measurements

<table>
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<tr>
<th>Groups</th>
<th>PYG* (n=6)</th>
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*Note: PYG=Parent Youth Group; PG=Peer Group; CG=Control Group; mm=millimeters; lbs.=pounds; i= inches; df=Degrees of Freedom
### Table 3

Outcomes of Total Group Measures Gained or Lost for Fat Mass, Body Weight, and Body Circumference Measurements

<table>
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<tr>
<th>Groups</th>
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*Note: PYG=Parent Youth; PG=Peer Group CG=Control Group; mm=millimeters; lbs.=pounds; i= inches
Table 4
Descriptive Statistics and ANOVA Results for Groups on The Multidimensional Body-Self Relations Questionnaire Overall Body Image and Subscales

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<th>Groups</th>
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*Note: P/Y=Parent Youth; CG=Control Group; df-Degrees of Freedom
Table 5

Outcomes of Total Group Measures Gained or Lost for Overall Body Image and Body Image Subscales

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<td>Overall Body Image</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance Evaluation</td>
<td>16.11</td>
<td>16.93</td>
<td>Gained 0.82</td>
</tr>
<tr>
<td>Pretest</td>
<td>Posttest</td>
<td>+ or -</td>
<td>Pretest</td>
</tr>
<tr>
<td>Appearance Orientation</td>
<td>2.71</td>
<td>3.50</td>
<td>Gained 0.79</td>
</tr>
<tr>
<td>Body Areas Satisfaction</td>
<td>0.0</td>
<td>0.11</td>
<td>Lost 0.25</td>
</tr>
<tr>
<td>Scale Overweight</td>
<td>2.98</td>
<td>3.43</td>
<td>Gained 0.45</td>
</tr>
<tr>
<td>Preoccupation</td>
<td>2.46</td>
<td>2.58</td>
<td>Gained 0.12</td>
</tr>
<tr>
<td>Self-Classified Weight</td>
<td>3.96</td>
<td>3.67</td>
<td>Lost 0.29</td>
</tr>
</tbody>
</table>

*Note: P/Y=Parent Youth; CG=Control Group
APPENDIX A

HEALTH EDUCATION OUTLINE
Goals: To introduce everyone to the facilitator, Dr. Gaggino and other participants,
to review the different components and expectations of the program,
to educate about the exercise component, and to attain consent
and appropriate written documentation

Outline:
I. Greeting from facilitator and Dr. Gaggino who will be present for assistance
II. Reviewing the consent form and protocols of the D.E.B. Power Plan
III. Explanation and demonstration of the various exercise components and RPE scale
IV. Expectations regarding the additional exercise times outside of program will be given and answering all questions regarding participation
V. Signatures of consent/assent forms
VI. Introductions of names and some personal information by all present
VII. Self-report questionnaires passed out
VIII. One by one participants called to private area for body measurements
IX. One by one participants will be weighed backwards on a scale

Week Two: Goal setting & 45 minutes of exercise

Goals: To identify what goals are, to explore obstacles to attaining goals, to set individual goals and the necessary components to attain them

Outline:

I. Written descriptions of different goals are folded and placed in a bowl
   A. Examples-Pass a test, Get an A in a class, Wear a smaller size pant
II. Participants are divided into two groups
   A. Two participants in each group pick a goal out of the bowl
   B. Small group discussion occurs in each group about goals
   C. What needs to be done to attain goal
   D. Obstacles to attaining goal
   E. Visualizing the outcome of attaining the goal

III. All participants come together as a whole to discuss results

IV. All participants write on paper their specific goal from D.E.B. Power Plan

V. All participants were to follow needs to obtain goal, obstacles to goal, solutions to obstacles, and have two support people

VI. All participants requested to quietly visualize the end results of goal

Week Three: Nutrition & 45 minutes of exercise (handouts appendix’s A, B, C, and D & E)

Goals: To understand the food guide pyramid, to understand the components of healthy snacks, to be able to prepare a variety of sandwiches, to be able to identify healthy foods for sports

I. Discussion of the various components of Food Guide Pyramid

II. Participants write on handout (appendix C) different examples in each category or draw a picture of what a nutritious meal

III. Discussion of various types of snacks and sandwiches

IV. Discussion of various types of sport foods

V. Group input on examples of healthy eating habits

Week Four: Stress management & 45 minutes of exercise (handouts appendix F)
Goals: Develop an awareness of stressors, to have a greater understanding of how nutrition and exercise can help in coping with exercise, to equip the participants with a variety of methods in dealing with stress

Outline:

I. Identifying stressors such as test anxiety, peer rejection, cloth shopping, moving, success, change etc.

II. Appendix F handed out

III. Will follow the outline of Appendix F

Week Five: Eating cues and & 45 minutes of exercise (handouts appendix G)

Goals: To identify marketing cues to entice hunger, to identify social situations to entice hunger, to identify emotional cues to entice hunger, to understand the hunger scale and its application to eating cues

Outline:

I. Marketing cues at stores, magazines, TV commercials and billboard identified

II. Social situations such as birthday parties, celebrations, and people pressure identified

III. Emotional cues such as anger, boredom, loneliness and joy identified

IV. Appendix G distributed and discussed

V. Hershey kisses passed out and smell and taste discussed
   a. One per person
   b. The first five seconds is when the taste buds most sensitive

Week Six: Self-esteem & 45 minutes of exercise (handouts appendix H)
Goals: To identify the media's message about thinness, to review current magazines in how thinness is promoted, to understand the components of self-esteem robber and boosters

Outline:

I. Discussion of media's promotion of model thinness
II. Computer enhancement discussed
III. Popular teen magazines distributed to group for evaluation
   a. Assignment to find different body sizes
IV. Appendix H distributed and discussed

Week Seven: Pubertal changes and body type (presented by Dr. Gaggino) & 45 minutes of exercise

Goals: To understand the physical development process of adolescence, to understand different physical body types, to understand America's Culture regarding body size

Outline:

I. Overview of physical changes during adolescence
II. Discussion of China's foot wrap procedure for girls
III. Discussion of different body types and genetic regarding them
IV. Discussion of cultural influences regarding body shapes

Week Eight: Post-assessments and closure activities

Goals: To conduct post-assessments. Dr. Gaggino will be present for assistance.
APPENDIX B

WMU HUMAN SUBJECTS REVIEW BOARD
Date: August 6, 2004

To: Amos Aduroja, Principal Investigator
   Deb Braley, Student Investigator for thesis

From: Amy Naugle, Ph.D., Interim Chair

Re: HSIRB Project Number: 04-03-02

This letter will serve as confirmation that your research project entitled "The Influence of Social Relationship and Health/Exercise Program on Muscle Mass and Body Image Among Selected Adolescents" has been approved under the full category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: May 19, 2005
APPENDIX C

BRONSON METHODISTS HOSPITAL INSTITUTIONAL REVIEW BOARD
At the July 8, 2004 Meeting of the Bronson Methodist Hospital Institutional Review Board, Protocol and Informed Consent BMH-2004-0115 was approved pending changes.

Having received the changed document(s), BMH-2004-0115 is approved to begin.

The Bronson Methodist Hospital Institutional Review Board has determined the continuing review interval for this study to be set at:

- 1 month
- 2 months
- 3 months
- 6 months
- X 12 months

Determined Risk: Minimum

The IRB approval for this protocol expires on July 7, 2005

Research must be conducted according to the protocol version approved. ► The principal investigator is required to receive approval from the IRB before initiating any changes in the approved protocol or its related informed consent (if applicable) during the period for which it was approved. ► Adverse events must be reported promptly to the IRB. ► Each study participant should receive a copy of the informed consent document (if appropriate). ► Records must be retained for a minimum of three years. ► Future correspondence should include the BMH identification/protocol number provided and the study title.

A. Aduroja, PhD, L. Gaggino, MD, D. Braley, BS attended this meeting and has agreed to the above procedures.

James W. Carter, MD, FACP
Chairman
Bronson Methodist Hospital
Institutional Review Board
APPENDIX D

WMU HUMAN SUBJECTS REVIEW BOARD/CHANGE
Date: August 11, 2004

To: Amos Aduroja, Principal Investigator
    Deb Braley, Student Investigator for thesis

From: Amy Naugle, Interim Chair

Re: HSIRB Project Number: 04-03-02

This letter will serve as confirmation that the change to your research project “The Influence of Social Relationship and Health/Exercise Program on Muscle Mass and Body Image among Selected Adolescents” requested in your memo dated August 11, 2004 (use of the scaling and anchoring instructions included with the OMNI Scale of Perceived Exertion for Children) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: May 19, 2005